# INCOMPLETE ALIGNMENT

**An incomplete alignment is a chain or alignment with missing elements. The incomplete alignment set of commands permits a chain or alignment to be defined with certain unknowns.**
**The Incomplete Alignment commands solve the unknown parts of the given alignment, define and store each curve and POT, and generate and store the new chain name. The initial points must be known or redefined by its new coordinates.**

**One or two unknown distances**
**One or two unknown directions**
**One, two, or three unknown angles**
**One or two unknown radii**
**(One unknown distance, one unknown direction, one unknown angle or radius)**

**The program *solves* for the unknowns, to a maximum of three unknowns, *defines* the incomplete (unknown) elements and stores the chain.**
**NOTE: THREE UNKNOWN DISTANCES IS NOT SUPPORTED**

**Command Incomplete Alignment structure**

| | |
|---|---|
| **ALI name INC** | **opening command to activate the incomplete alignment** |
| **Initial POT command** | **only required for the initial point** |
| **Intermediate POT command** | **required for each POT (other than initial point)** |
| **CURve command** | **required for each curve** |
| **SPIral command** | **required for each spiral** |
| **Ending POT** | **represents the terminal point of incomplete alignment** |
| **END ALIgnment command** | **closing command to start calculation of the missing element(s) and generate new chain** |

**INCOMPLETE ALIGNMENT COMMAND. The Alignment Name Incomplete command is the first statement and activates the incomplete alignment group of commands.**

**ALIgment name INComplete**
**ALI L1REV OPEN**

## INITIAL POINT (POT) COMMAND FOR INCOMPLETE ALIGNMENT.

**The initial point command represents the starting point of the new alignment or chain name. There is an optional station command, which if not used will start at 0+00.00**

**FORMAT A:**
**POT *pa* TD direction (STAtion station) where *pa* is a previously stored point**
**POT 10 TD N 16 52 32 E STA 24+25.36**

**FORMAT B:**
**POT n N northing E easting TD distance (STATION station)**
**POT 100 N 76531.66 E 2094824.90 TD N 16 52 32 E STA 12+00.04**

**POT n X easting Y northing TD distance (STATION station)**
**POT 100 X 2094824.66 Y 76531.66 TD N 16 52 32 E STA 12+00.04**

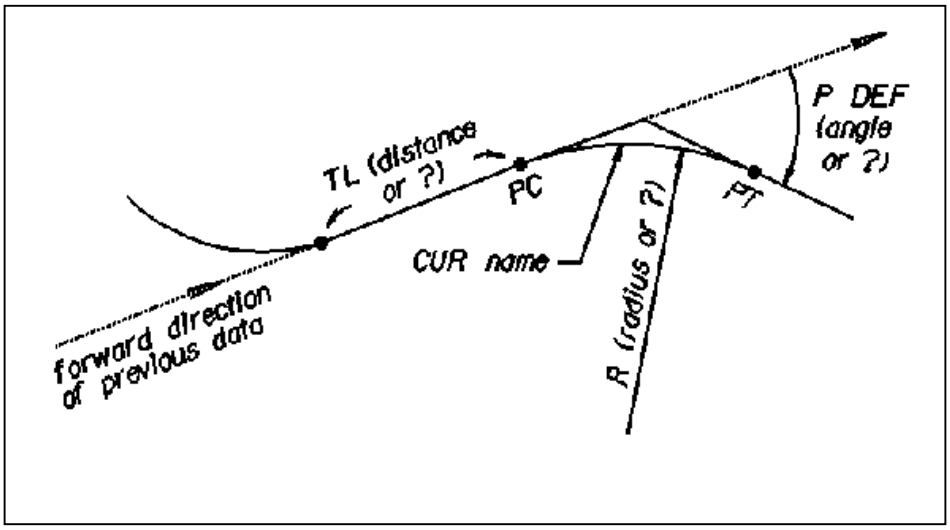
## CURVE COMMAND FOR INCOMPLETE ALIGNMENT.

**The curve command creates a new curve name defined by a minimum of three data types: TL (back tangent length), R radius of curvature and (P/M) DEFlection angle (plus or minus the external angle of deflection). The given data and is linked to the previous element in the chain. There are four FORMATS for curve data.**

**FORMAT A: The back tangent distance (TL), a radius of curve (R) and the (P / M ) deflection angle (P DEF angle), defines the curve name.**
**(The direction of the TL is defined by the forward direction of the previous data.)**

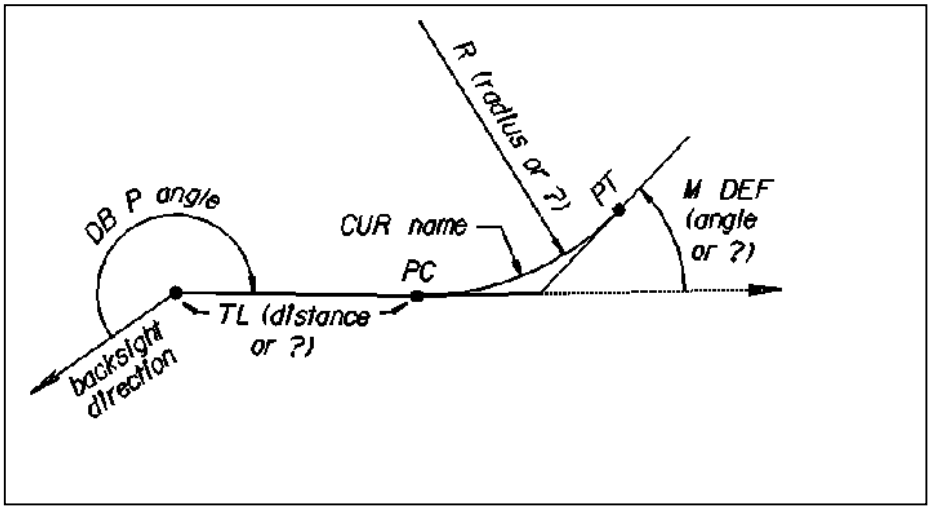
**CURve name TL distance R radius (P / M) DEFLECTION angle**
**CUR C1 TL 350 R 1909.8593 P DEF 20 05 08.2**
**CUR C1 TL 0 R 1909.8593 P DEF 20 05 08.2**

**Note: TL can be zero if the PC is at the initial point.**



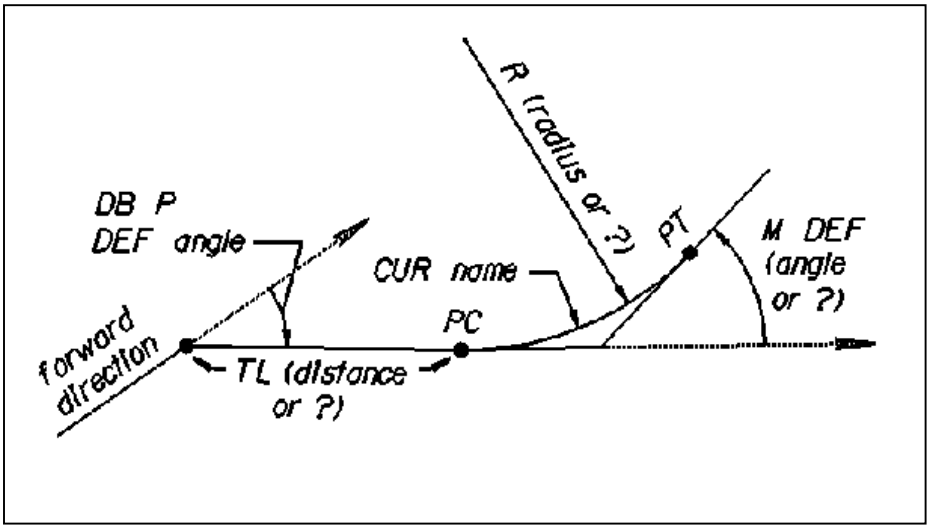
**FORMAT B:** **The curve name is defined by the "*backsight direction*" of the TL to the previous element plus or minus clockwise angle (*DB P angle). The ahead tangent direction is defined by radius of curvature (R), plus or minus deflection angle (*M DEF angle). *See drawing**

**CURve name DB (P/M) angle TL distance RADIUS radius (P/M) DEFlection angle**
**CUR C1 DB P 210 00 00 TL 350.00 R 1909.8593 M DEF 20 05 08.2**




**FORMAT C:** **The curve name is defined by the "*forward direction* of the TL *distance*" from the previous element, plus or minus deflection angle (DB P angle angle*). The tangent ahead of the TL is defined by radius of curvature and plus or minus deflection angle (M DEF angle*). *See drawing**

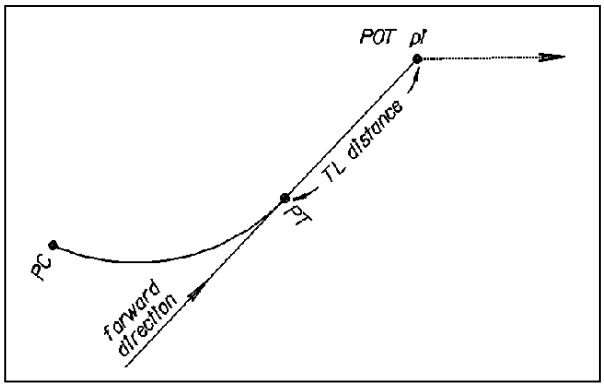
**CURve name DB (P/M) DEFlection angle TL distance Radius radius (P/M) DEFlection angle**
**CUR C13 DB P DEF 37 25 30 TL 157.35 R 1525 M DEF 52 35 28**



**INTERMEDIATE POT COMMAND FOR INCOMPLETE ALIGNMENT. The POT command represents an intermediate point *pi* on the incomplete alignment. It is calculated by its distance (TL distance) and forward direction from the previous element.**

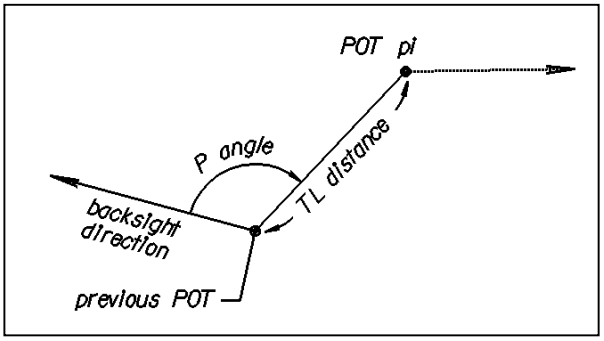
**FORMAT A: the *pi* is calculated by its "TL distance", measured from the previous *PT,* and the direction given from the previous element.**

**POT *pi* TL distance**
**POT 40 TL 340.22**



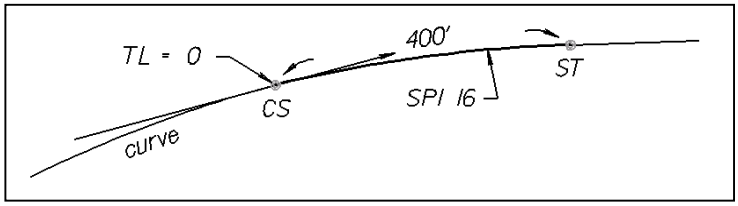

**FORMAT B: The pi is calculated by its "TL distance", measured from the previous POT while the direction is defined by way of the backsight direction plus or minus clockwise angle.**

**POT *pi* (P / M) (DEF) angle TL distance**
**POT 40 P DEF 67 34 25 TL 178.48**
**POT 40 67 34 25 TL 178.48** ← **This is iffy, use with caution**

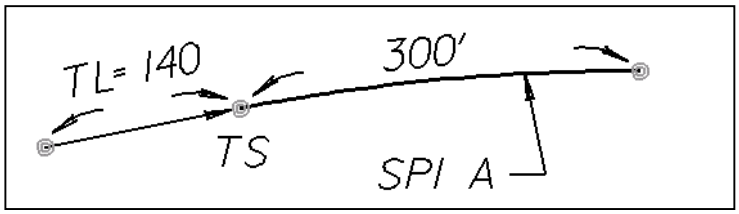


**SPIRAL COMMANDS FOR INCOMPLETE ALIGNMENT. The Spiral commands create a new spiral name defined by a minimum of two data types: TL (back tangent length) and LS (length of Spiral. The new spiral is linked to the previous element in the chain to set its position in the alignment.**

**SPIral name TL distance LS length**
**SPI S16 TL 0 LS 300**




**SPI A TL 140 LS 300**

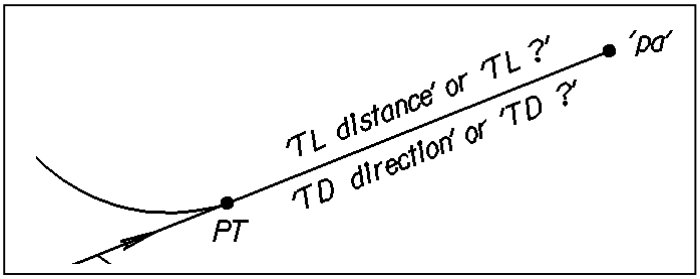



**ENDING POT COMMAND FOR INCOMPLETE ALIGNMENT. The Ending POT command represents the terminal point of the incomplete alignment and must be a point already stored *pa* or redefined by its coordinates N northing E easting.**

**FORMAT A: The point *pa* is already stored, TL distance measured from the previous PT and the TD direction is the forward direction from the previous element.**

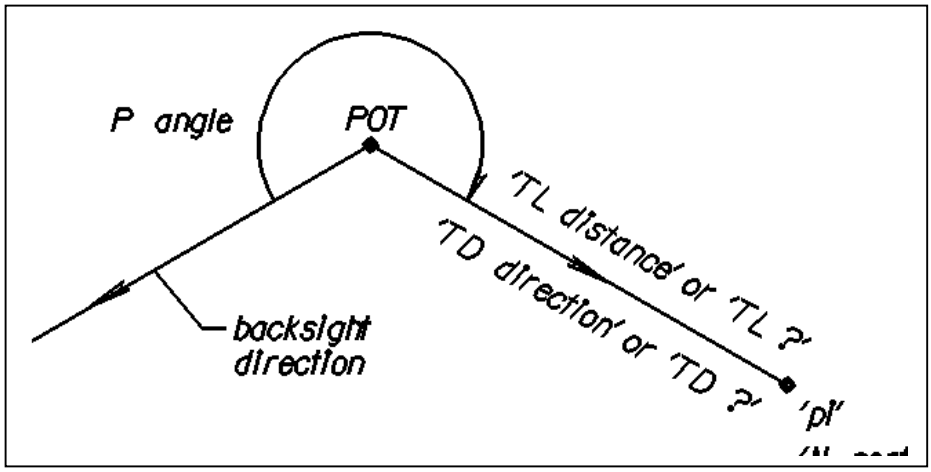
**POT *pa* (P / M (DEF) angle) TL distance TD direction**
**POT 53 TL 435.28 TD ?**
**POT 53 TL ? TD PI SPI S16 ST SPI S16**

**the direction is defined as the PI of a spiral to the ST of the spiral (also curve PI to curve PT)**



**FORMAT B: The ending point is redefined by its coordinates N northing E easting, TL distance measured from the previous POT, and TD direction is defined by the backsight direction to a previous element plus or minus clockwise angle (*P angle).**

**POT *pi* N northing E easting (P / M (DEF) angle) TL distance TD direction**
**POT 56 N 967352.1710 E 2399059.2480 TL ? TD ?**




**END INCOMPLETE ALIGNMENT COMMAND AND DESCRIBE CHAIN. The End Alignment command initiates the calculation process of the new chain name computes unknowns, stores curves, POT's and chain, then deactivates the incomplete alignment definition. Format C describes the chain name as stored.**

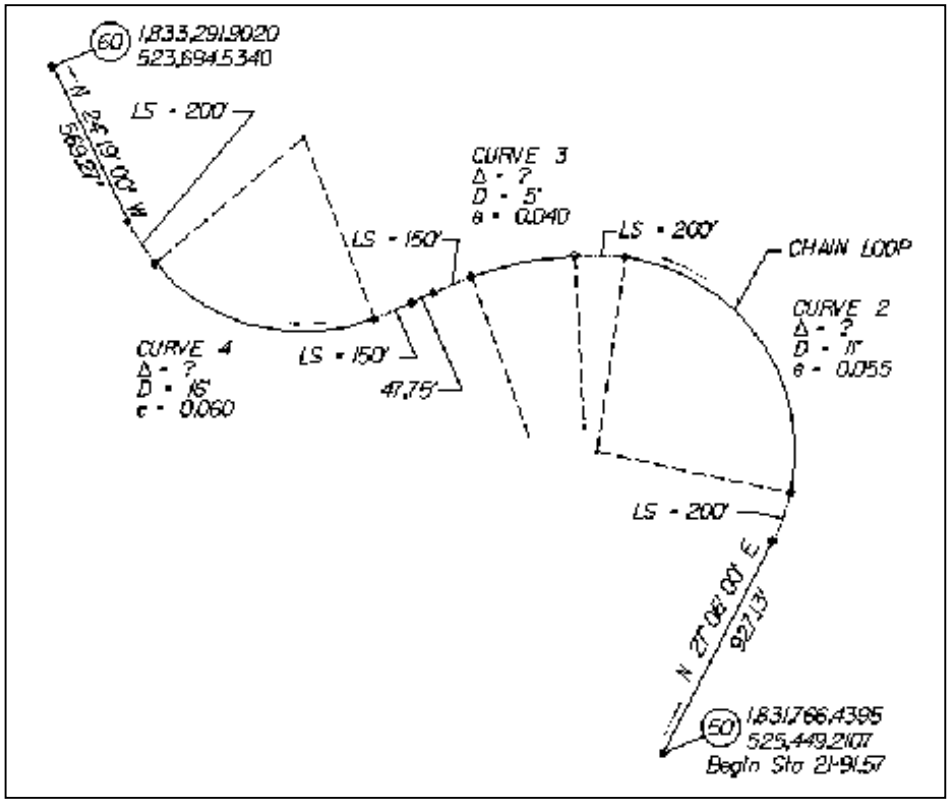
**FORMAT A:**
**END ALIgnment**

**FORMAT B:**
**END ALIgnment name**

**FORMAT C:**
**END ALIgnment name DEScribe**

**WRITE COMMAND LINES FOR THE INCOMPLETE ALIGNMENTS FOR THE EXAMPLES SHOWN**

**EXAMPLE 3**




**EXAMPLE 4**